Developing a knowledge management system for storing and using the design knowledge acquired in the process of a user-centered design of the next generation information appliances

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This project developed the next generation information appliances by user-centered design, acquired and stored the knowledge which designers used in the design process, and developed a knowledge management system for supporting the knowledge users to develop their own product ideas. It applied a scenario-based design and an ethnographic study as methods for user-centered design in to developing new product ideas required by the users. It stored the designer's knowledge in knowledge bases and linked the knowledge connected in the design process to show where it came from. The links help the knowledge users trace the design process, get the design knowledge, and develop their own product ideas. This will make the results from this project facilitate the development of the next generation information appliances.

Keywords: design knowledge, design process, product design, innovation, user-centered design

The next generation information appliances (NGIAs) are those that can be connected with other appliances through a wired or wireless network in order to transmit and receive data between them. NGIAs can be remotely controlled from inside or outside of the home. The emergence of NGIAs makes new functions possible that were not available when they were used independently, and gives opportunities to create a new market in an already saturated home appliances market.

Many companies have conducted user-centered design for developing NGIAs such as *Vision of the Future* by Philips (1998), *Designing the PDA of the Future* by Marcus and Chen (2002), *Cooltown* by HP (2002), and *New Life Forms* by Motorola (2000). Philips Electronics conducted research on what users think will be useful, desirable, and beneficial in the future, and made a technological road map on how to achieve these goals, while suggesting future products, making design mockups, and producing videos to show natural scenes in

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which the proposed products are being used in realistic future situations (Philips, 1998). Based on the socio-cultural and technological research, Philips set up teams consisting of cultural anthropologists, agronomists, sociologists, engineers, product designers, interaction designers, exhibition designers, graphic designers, and video and film experts, and developed more than 300 scenarios. The scenarios (short stories describing a product concept and its use) were generated using five parameters: people, time, space, objects, and circumstances. They were refined and filtered using the four criteria: 'Will they provide users with an obvious benefit?', 'Will they fit with Philips' major areas of competence and interest?', 'Will they be technologically feasible?', and 'Will they be applicable to the socio-cultural area Philips defined?'. As a result, the original 300 scenarios were reduced to 60 well-defined concept descriptions. The 60 product concepts were then grouped into four manageable categories: personal, domestic, public, and mobile.

Marcus and Chen (2002) developed the concepts for the next generation of wireless information devices. They conducted research on market trends, emerging mobile technologies, and advanced user interface technologies. In addition, a diverse group of users, including a minister; a male college student; a female high school student; a commuting professional; and a female, single-parent Silicon Valley entrepreneur were observed closely on a daily basis. The focus was on their activities related to information use and the issue was to try to understand needs that even the users could not express. To organize the complex and multilayered habits of the users observed in this process, an analytic framework was created. The framework divided the usage categories of the wireless devices into information, self-enhancement, maintaining relationships, entertainment, and M-commerce. This framework proved useful in developing product strategies and concepts. Following the research and strategy phase, they carried out a series of structured brainstorming sessions, turning out detailed explanations, user scenarios, and sketches for approximately 100 product concepts. An interactive prototype was also made to demonstrate certain scenarios. The prototype was effective in providing solutions for complex problems, such as creating appointments, using voice commands, and taking notes during a phone call.

Similar projects were reported, called *Cooltown* by HP (2002) and *New Life Forms* by Motorola (2000). They also developed future product concepts, made them into mockups, and produced video films showing natural scenes. However, the four projects above only presented their design processes and final product ideas briefly without opening the knowledge they acquired from the processes. If Philips, for example, opens the 300 scenarios generated by a diverse group of experts using the five parameters and Marcus and Chen open the user's activities related to information usage, the designers, who want to develop future product concepts, will not have to spend their time and efforts on generating the scenarios or activities.